

Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1 1. (currently amended) An electronic ballast
2 comprising:
3 a phase dimmer compatible circuit including an input
4 rectifier circuit for rectifying an input
5 voltage;
6 a voltage inverter circuit for receiving a rectified
7 input voltage from said phase dimmer compatible
8 circuit input rectifier circuit, and for
9 providing voltage/current a voltage and/or
10 current to a discharge lamp for providing a
11 dimmable light;
12 ~~a controller for controlling the operation of the~~
13 ~~voltage inverter circuit, and~~
14 a keep-alive feedback circuit for feeding back
15 energy from said discharge lamp to said ~~voltage~~
16 ~~inverter circuit phase dimmer compatible~~
17 ~~circuit to support allow a high dimming~~
18 operation.

1 2. (original) The ballast of claim 1, wherein said
2 keep-alive feedback circuit utilizes a capacitor for said
3 feeding back energy.

1 3. (currently amended) The ballast of claim 1,
2 wherein
3 said input rectifier comprises a plurality of
4 diodes, and further wherein

5 said keep-alive feedback circuit comprises a
6 capacitor connected to both said phase dimmer
7 compatible circuit ~~rectifier circuit~~ and the
8 discharge lamp for ensuring that at least one
9 of said plurality of diodes is always
10 conducting.

1 4. (currently amended) The ballast of claim 1
2 further comprising:

3 a controller; and
4 a constant voltage supply circuit connected to said
5 ~~rectifier circuit~~ phase dimmer compatible
6 circuit and for supplying a substantially
7 constant voltage to said controller, wherein
8 said constant voltage supply circuit uses a voltage
9 of one or both of the discharge lamp and said
10 inverter circuit to provide said a
11 substantially constant voltage to said
12 controller when the input current is low due to
13 the high dimming operation.

1 5. (currently amended) The An electronic ballast of
2 claim 1, comprising:

3 a phase dimmer compatible circuit including an input
4 rectifier circuit for rectifying an input
5 voltage;
6 a voltage inverter circuit for receiving a rectified
7 input voltage from said phase dimmer compatible
8 circuit, and for providing a voltage and/or
9 current to a discharge lamp for providing a
10 dimmable light; and

11 a keep-alive feedback circuit for feeding back
12 energy from the discharge lamp to said phase
13 dimmer compatible circuit to support a dimming
14 operation, wherein

15 said input rectifier circuit includes: a plurality
16 of diodes operating at a frequency above the
17 frequency of the input voltage, wherein at any
18 given time at least one diode is in a
19 conducting mode due to said keep-alive feedback
20 circuit.

1 6. (original) The ballast of claim 5, wherein said
2 rectifier circuit further includes a capacitor for
3 reducing a crest factor of the discharge lamp.

1 7. (original) A dimmable discharge lighting
2 apparatus comprising:

3 the electronic ballast of claim 1; and
4 said discharge lamp, wherein
5 said apparatus is for providing a dimmable light
6 when connected to a dimming circuit for
7 providing the input voltage.

1 8. (currently amended) An electronic ballast
2 comprising:

3 a phase dimmer compatible circuit including an input
4 rectifier circuit for rectifying an input
5 voltage;

6 a voltage inverter circuit for receiving a rectified
7 input voltage from said input rectifier
8 circuit, and for providing voltage/current a

9 voltage and/or current to a discharge lamp for
10 providing a dimmable light;
11 a controller for controlling the operation of the
12 voltage inverter circuit; and
13 a constant voltage supply circuit for supplying a
14 substantially constant voltage to said
15 controller, wherein
16 said constant voltage supply circuit provides said
17 substantially constant voltage both at low
18 input currents and at high input currents, and
19 wherein
20 said constant voltage supply circuit provides a
21 substantially constant voltage related to one
22 or both of a voltage of said inverter circuit
23 and a voltage of the discharge lamp.

1 9. (original) The ballast of claim 8, wherein said
2 constant voltage supply circuit uses a voltage of the
3 discharge lamp to generate said substantially constant
4 voltage during the low input currents, and further
5 wherein said constant voltage supply circuit uses said
6 voltage pulses of said inverter circuit to generate said
7 substantially constant voltage during the high input
8 currents.

1 10. (currently amended) The ballast of claim 8,
2 wherein said input voltage is from a dimming circuit, and
3 wherein said constant voltage supply circuit includes:
4 a first capacitor connected to said inverter circuit
5 for generating a first current based on the

1 11. (original) The ballast of claim 10, wherein said
2 constant voltage supply circuit further includes a
3 plurality of diodes for rectifying said first current and
4 said second current.

1 12. (original) The ballast of claim 8 further
2 comprising a keep-alive feedback circuit for feeding back
3 energy from said discharge lamp to said voltage inverter
4 circuit to allow a high dimming operation of said
5 apparatus.

1 13. (original) A dimmable discharge lighting
2 apparatus comprising:

3 the electronic ballast of claim 8; and
4 said discharge lamp, wherein
5 said apparatus is for providing said dimmable light
6 when connected to a dimming circuit for
7 providing the input voltage.

1 14. (currently amended) An electronic ballast
2 comprising:
3 an a phase dimmer compatible circuit including an
4 input rectifier circuit for rectifying an input
5 voltage from a dimming circuit;
6 a voltage inverter circuit having solid-state
7 switches for receiving a rectified input
8 voltage from said input rectifier circuit, and
9 for providing a voltage and/or current
10 voltage/currents to a discharge lamp for
11 providing a dimmable light;
12 a controller for controlling the operation of the
13 voltage inverter circuit;
14 a keep-alive feedback circuit for feeding back
15 energy from said discharge lamp to said voltage
16 inverter circuit phase dimmer compatible
17 circuit to allow a high dimming operation; and
18 a constant voltage supply circuit for supplying a
19 substantially constant voltage to said
20 controller, wherein said constant voltage
21 supply circuit uses a voltage of the discharge
22 lamp to generate said substantially constant
23 voltage during a high dimming operation of the
24 dimming circuit, and further wherein said
25 constant voltage supply circuit uses said
26 voltage/current of said inverter circuit to
27 generate said substantially constant voltage
28 during a low dimming operation of the dimming
29 circuit.

1 15. (original) The ballast of claim 14, wherein said
2 input rectifier includes:

3 a plurality of rectifier diodes operating at a
4 frequency above the frequency of the input
5 voltage, wherein at any given time at least one
6 diode is in a conducting mode due to said keep-
7 alive feedback circuit; and
8 a capacitor for reducing a crest factor of the
9 discharge lamp

1 16. (original) The ballast of claim 15, wherein said
2 constant voltage supply circuit includes:

3 a first capacitor connected to said inverter circuit
4 for generating a first current based on a
5 voltage of said inverter circuit; and
6 a second capacitor connected to the discharge lamp
7 for generating a second current based on a
8 voltage of said discharge lamp, wherein
9 said constant voltage supply circuit sums the first
10 current and the second current to generate said
11 substantially constant voltage.

1 17. (original) The ballast of claim 16, wherein said
2 keep-alive feedback circuit utilizes a capacitor for said
3 feeding back energy.

1 18. (original) A dimmable discharge lighting
2 apparatus comprising:
3 the electronic ballast of claim 17; and
4 said discharge lamp, wherein

5 said apparatus is for providing a dimmable light
6 when connected to the dimming circuit having a
7 phase dimmer.

1 19. (original) A dimmable discharge lighting
2 apparatus comprising:

3 the electronic ballast of claim 14; and
4 said discharge lamp, wherein
5 said apparatus is for providing a dimmable light
6 when connected to the dimming circuit having a
7 phase dimmer.

1 20. (original) The ballast of claim 14, wherein said
2 constant voltage supply circuit includes:

3 a first capacitor for generating a first current
4 based on a voltage of the discharge lamp; and
5 a second capacitor for generating a second current
6 based on a voltage output by said inverter
7 circuit, wherein
8 said constant voltage supply circuit sums the first
9 current and the second current to generate said
10 substantially constant voltage.

1 21. (new) The ballast of claim 1, wherein said
2 rectifier circuit is operated at a switching frequency of
3 about that of said inverter circuit and different from a
4 switching frequency of said input voltage to maintain a
5 substantially constant input current.

1 22. (new) The ballast of claim 1, wherein said phase
2 dimmer compatible circuit further includes a plurality of

3 capacitors connected at a common point, and wherein said
4 keep-alive feedback circuit feeds back said energy to
5 said common point.

1 23. (new) The ballast of claim 22, wherein said
2 rectifier circuit includes a plurality of diodes, and
3 wherein said plurality of capacitors is at least three
4 and further wherein each of said plurality of capacitors
5 is connected to at least one of said plurality of diodes
6 in said rectifier circuit.

1 24. (new) The ballast of claim 23, wherein said
2 common point is not directly connected to any of said
3 plurality of diodes in said rectifier circuit.

1 25. (new) The ballast of claim 8, wherein said
2 constant voltage supply circuit provides said
3 substantially constant voltage by obtaining energy from
4 both said inverter circuit and the discharge lamp.

1 26. (new) An electronic ballast for use with an
2 external phase dimmer comprising:

3 a phase dimmer compatible circuit including a
4 rectifier circuit adapted for rectifying a
5 variable input current;
6 an inverter circuit coupled to the phase dimmer
7 compatible circuit for converting the rectified
8 current into high frequency alternating current
9 to power a discharge lamp;
10 a feedback circuit for feeding back current from the
11 discharge lamp to the phase dimmer compatible
12 circuit in order that the phase dimmer

13 compatible circuit can draw substantially
14 continuous current from the external phase
15 dimmer.

1 27. (new) The ballast of claim 26 wherein the phase
2 dimmer compatible circuit comprises a plurality of diodes
3 configured in a full wave bridge configuration and
4 operating at a frequency substantially the same as the
5 inverter circuit.

1 28. (new) The ballast of claim 27 wherein at any
2 given time at least one diode is in a conducting mode.

1 29. (new) The ballast of claim 27 wherein the phase
2 dimmer compatible circuit further comprises a capacitor
3 for reducing the crest factor of the discharge lamp.

1 30. (new) The ballast of claim 26 further
2 comprising:
3 a dimming control circuit for controlling the
4 operation of the inverter circuit through a
5 dimming range;
6 a constant voltage supply circuit for providing a
7 substantially constant voltage to the dimming
8 control circuit, said constant voltage relating
9 to one or more of a voltage of said inverter
10 circuit and said discharge lamp.

1 31. (new) An electronic ballast for use with an
2 external phase dimmer comprising:
3 a phase dimmer compatible circuit including a
4 rectifier circuit adapted for rectifying a
5 variable input current;

6 an inverter circuit coupled to the phase dimmer
7 compatible circuit for converting the rectified
8 current into high frequency alternating current
9 to power a discharge lamp;
10 a dimming control circuit for controlling the
11 operation of the inverter circuit through a
12 dimming range;
13 a constant voltage supply circuit for providing a
14 substantially constant voltage to the dimming
15 control circuit, said constant voltage relating
16 to one or more of a voltage of said inverter
17 circuit and said discharge lamp.

1 32. (new) The ballast of claim 31 further comprising
2 a feedback circuit for feeding back current from the
3 discharge lamp to the phase dimmer compatible circuit in
4 order that the phase dimmer compatible circuit can draw
5 substantially continuous current from the external phase
6 dimmer.